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PROSPECTS FOR REVITALIZING THE MARKET FOR SORGHUM SIRUP

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In view of the changing trends in world production and consumption of sweeteners, particularly those exerting upward pressure on sugar prices, increasing attention is being given to alternative sweeteners.

While the findings in this report pertain to sorghum sirup produced in a demonstration plant utilizing improved equipment and processing methods, maple sirup could also be produced in a plant of this type.

Thus, the project serves a dual purpose, indicating economic advantages that could be attained by locating a moderate scale commercial plant of this type in areas where sweet sorghum can be grown in summer and maple sap can be collected in winter.

Mention of company names does not constitute a guarantee or warranty of the company by the U.S. Department of Agriculture or an endorsement by the Department over other companies not mentioned.

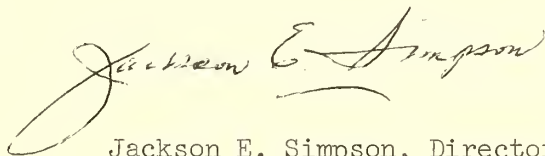
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FOREWORD

Over the past 100 years the domestic production of sorghum has peaked two different times. Just before the Civil War the U.S. annual production was about 7 million gallons. This increased to a peak of over 28 million gallons in the early 1880's, largely caused by sweetener shortages precipitated by the Civil War. Production then declined to less than 15 million gallons annually around 1910-15. World War I gave a tremendous impetus to sorghum sirup demand, output reaching another peak of nearly 50 million gallons in 1920. During the next decade, sorghum sirup output rapidly declined to less than 9 million gallons in 1930. World War II did not particularly increase the demand for this product and by 1950 total yearly U.S. production was below 5 million gallons. Production has steadily decreased since that time, and today the annual output is under 1 million gallons.

Past generations liked the wild tangy flavor, the dark color, and the high viscosity of sorghum sirup. Today's market, however, prefers the lighter, more bland sirups and sweeteners. Perhaps it is timely for sorghum sirup manufacturers to modify products to meet these new needs and, further, to consider other market outlets. With these objectives in mind, the ARS Agri-business Program (USDA) has undertaken a two-part program.

This publication presents the current situation and offers new directions for consideration. A later publication will describe the design and operation of an improved plant embracing new processing techniques -- particularly continuous evaporation and enzymatic treatment -- where advantages were established in a commercial demonstration plant constructed and operated by Virginia Polytechnic Institute, Blacksburg, Virginia, under a contract with the ARS Agri-business Program.

A handwritten signature in dark ink, reading "Jackson E. Simpson". The signature is fluid and cursive, with a large, sweeping initial "J" that extends downwards and to the left.

Jackson E. Simpson, Director
Agri-business Program
Agricultural Research Service

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ACKNOWLEDGMENTS

This report is part of a project concerned with the production of sorghum sirup in a commercial-scale demonstration plant. Supported by the Agri-business Program, Agricultural Research Service, U.S. Department of Agriculture, under contract with the Virginia Polytechnic Institute, the plant was constructed and operated under the direction of J. Peter Clark, Department of Chemical Engineering and Malcolm Wright, Department of Agricultural Engineering.

The technical assistance of the Waconia Sorghum Co., Cedar Rapids, Iowa, the largest sorghum sirup producer in the United States, is gratefully acknowledged.

The cooperation of the participating firms is also gratefully acknowledged. Frederick D. Gray of the Economic Research Service, USDA, provided helpful information about the sweetener industry.

PROSPECTS FOR REVITALIZING THE MARKET FOR SORGHUM SIRUP

By Daniel A. Swope ^{1/}

SUMMARY

The market prospects for sorghum sirup were investigated to provide entrepreneurs a basis for decisionmaking. Findings should be helpful to those who wish to establish sorghum sirup plants similar to the prototype demonstration plant operating at Virginia Polytechnic Institute, under contract with the Agri-business Program, Agricultural Research Service, U.S. Department of Agriculture.

Discussions were held with 21 representatives of the sirup industry, others engaged in marketing sirup, and those who might find new uses for the sirup in remanufacturing. Their observations on the current and future market for sorghum sirup and their problems in the production or marketing of sorghum sirup were obtained.

Based on these discussions and observations and in the expectation of the commercial adaptation of the prototype demonstration plant, conclusions and recommendations for revitalizing the market for sorghum sirup are given.

INTRODUCTION

In the past, sorghum sirup has been a favorite of people in the Southeast and Midwest. However, during the past decade or so its popularity has waned for various reasons. The domestic production of sweet sorghum has peaked two times over the past 100 years.

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Just before the Civil War the U.S. annual production was about 7 million gallons. The production peaked to over 28 million gallons in the early 1880's, largely caused by sweetener shortages precipitated by the Civil War. From 1910 to 1915 production declined to less than 15 million gallons annually.

World War I gave a tremendous impetus to sorghum sirup demand, the production peaking to nearly 50 million gallons in 1920. During the next decade, sorghum sirup production rapidly declined to less than 9 million gallons in 1930. World War II did not particularly increase the demand for this product and by 1950 total yearly U.S. production was below 5 million gallons. Production has steadily decreased since that time, and in 1975 the estimated annual output is under 1 million gallons.

Historically, sorghum sirup has been largely produced by open kettle evaporative condensation of the juice crushed from the sorghum cane of varieties classified as "sweet" sorghum. About 90 percent of the sorghum sirup produced in the United States comes from the eight States of Alabama, Arkansas, Georgia, Iowa, Kentucky, Mississippi, North Carolina, and Tennessee. 2/

In many places sorghum sirup continues to be produced by the old-style, open kettle, batch method on farms where sorghum is grown. Only one major firm, which is in the Midwest, produces sorghum sirup by a modern continuous evaporative process; the firm distributes sorghum sirup nationally. Otherwise, most of the sorghum sirup for the commercial market is produced by relatively small or intermediate producers, who sell in the local regions. The product is sold either as pure sorghum sirup or as a sorghum-flavored blend with a base of corn or cane sirup or in a variety of other formulations. Characteristically, the small producers have sold their annual output shortly after producing the sirup. Consequently, the market has been quite seasonal.

Although growers of sweet sorghum continue to produce the crop to satisfy local or regional consumer demand, the crop is not regarded as a very significant contributor to farm income. Nevertheless, interest has been shown in extending the production of sweet sorghum into areas that are culturally suitable and where it might become a significant cash crop.

PURPOSE AND SCOPE OF THIS PROJECT

To help plan and establish industries that will provide jobs and improve farm incomes in economically depressed areas, the ARS Agri-business Program of the U.S. Department of Agriculture recognized the need to revitalize a declining industry by developing improved sweet sorghum production and processing facilities suitable for moderate scale producers.

2/ U.S. Agricultural Research Service. Culture of Sweet Sorghum for Sirup Production. U.S. Dept. Agr. Handb. No. 441. 1973.

Under a contract with the Virginia Polytechnic Institute, Blacksburg, Va., a prototype plant was constructed to demonstrate the processing of sorghum sirup on a moderate, commercial scale. Cooperating in the project to construct and operate the plant and to produce and harvest the sorghum were the Departments of Chemical Engineering and Agricultural Engineering.

The processing procedure was partly adapted from that used by the largest sorghum producer in the country. The process features enzymatic treatment, both chemical and physical clarification of the sorghum juice, and continuous evaporation. Concentration of the juice to sirup was accomplished in the VPI demonstration plant by adapting a continuous evaporator, developed at the USDA, ARS Eastern Regional Research Center, for maple sap concentration.

An integral aspect of the project was the demonstration of mechanized cultural techniques appropriate for growing and harvesting sweet sorghum. Plots of different varieties of sweet sorghum were planted at different locations so as to observe the yields and quality of sirup obtainable from each. An important feature of the cultural aspect was the development of harvesting equipment and practices that are efficient in utilization of labor and conducive to efficient extraction of juice from the sorghum cane.

Since the prototype demonstration plant has proved capable of producing sorghum sirup of high quality at a seemingly competitive price, entrepreneurs will hopefully be motivated to establish new plants modeled after this prototype in areas where there is interest in growing sorghum or to replace outmoded plants.

This demonstration plant can also process maple sap to sirup with relatively minor modifications of the basic equipment and processing procedure. If a plant of this type were located where maple sap can be collected and transported economically, the plant would serve a dual purpose offering distinct economic advantages. Capital investment in the plant and overhead costs (taxes, insurance, and interest) could be spread over more units of output during the year. Thus the average cost per gallon of sirup would be reduced. Prospects for obtaining returns from both sorghum sirup and maple sirup products should be a motivating factor for entrepreneurs. There would be additional employment throughout the year and additional cash income to farmers who provide the maple sap.

The resurgence of consumer interest in natural sweeteners, and natural foods in general, is further reason to investigate possibilities for improving processing methods for such products as sorghum sirup and maple sirup and for establishing facilities suitable for producing these sirups in new locations. In view of the current high prices of sugar, some consumers might be motivated to try these sirups as alternative sweeteners.

Fundamental to the immediate objective involving the production of sorghum sirup, however, was the need to assess the market prospects for sorghum sirup and to explore the possibility of developing new market outlets. Special attention was given to the prospects for marketing additional supplies of sorghum sirup that would be produced by plants adapted from the prototype demonstration plant. Of particular interest, also, was the possibility of finding new commercial uses for sorghum sirup, as in baking or confectionery manufacture.

This publication provides some indication of the opportunities for marketing additional quantities of sorghum sirup, including observations on price ranges within which the sirup must be sold to be competitive with sorghum sirup from other areas and with alternative sweeteners.

TREND IN SIRUP PRODUCTION AND CONSUMPTION

In 1960, the last year for which production statistics on sorghum sirup were reported by USDA, the output was 1,943,000 gallons (table 1). This was a sharp drop from the 11.6 million gallons produced in 1945 and was only around one-half of the 3.5 million gallons produced 10 years earlier, in 1950. Nevertheless, the sorghum sirup output in 1960 was well above the 1.1 million gallons of maple sirup produced that year.

A comparison of the trends in production of the various kinds of sirups is obscured by the fact that so much of the sirup sold in the consumer market consists of blends. On the other hand, the published statistics on production pertain to the basic sirups which constitute these blends.

Corn sirup is by far the largest volume component of these blends (excluding sugar or "sugar sirup"). Its production has increased markedly -- from 130 million gallons in 1950 to 340 million in 1972. Over the past 20 years output of maple sirup has declined from 2 million gallons to an average of about 1 million gallons annually since 1967. Statistics on cane sirup production were last reported in 1969, when it was 2.7 million gallons. Before that year the annual volume of cane sirup was about the same as that for refiners sirup, but both declined sharply from the approximate 20-million gallon level in 1945.

Per capita consumption figures for the various sirups are based on quantities estimated to be consumed annually, reconciling any exports and imports. Also, the quantity used per person is more meaningful for demand analysis. Thus, the consumption of 18.7 pounds of corn sirup per person in 1972 towered above other sirups and honey (table 2). This is more than twice the amount used in 1955.

Although compilation of sorghum sirup consumption statistics was discontinued by USDA in 1960, consumption has been estimated by various people in the industry at a level of one-tenth of a pound per year per person in the subsequent years through 1969.

Table 1.--U.S. production of edible sirups, molasses, and honey, 1945-72

Year	<u>1/</u> Sirups							Total
	<u>2/</u> Corn	Cane	Sorghum	Maple	Refiners	Edible molasses	Honey	
	<u>1,000 gallons</u>	<u>1,000 gallons</u>	<u>1,000 gallons</u>	<u>1,000 gallons</u>	<u>1,000 gallons</u>	<u>1,000 gallons</u>	<u>1,000 gallons</u>	<u>1,000 gallons</u>
1945	156,417	19,897	11,649	1,030	22,020	6,922	19,785	237,720
1950	130,448	9,745	3,549	2,006	4,005	3,314	19,780	172,837
1955	138,226	4,730	2,405	1,578	3,853	2,820	21,666	175,278
1960	169,776	3,676	1,943	1,143	4,134	2,714	20,611	203,997
1965	243,682	2,989	...	1,266	2,994	2,648	20,427	274,006
1966	252,337	2,923	...	1,476	2,493	2,563	20,403	282,195
1967	255,860	2,121	...	979	2,402	2,477	18,225	282,064
1968	274,000	2,346	...	983	2,561	2,466	16,165	298,521
1969	282,000	2,661	...	1,032	2,235	2,532	22,591	313,051
1970	292,000	...	...	1,110	1,695	2,121	18,736	315,662
1971	304,000	...	...	962	1,883	2,517	16,674	326,036
1972	340,000	...	...	1,099	2,077	2,290	18,123	363,589

1/ Production of cane sirup, sorghum sirup, and edible molasses is of the fall of the preceding year. Estimates of sorghum discontinued, beginning 1961; cane sirup discontinued beginning 1969.

2/ Unofficial estimates for corn sirup 1968-72.

Source: U.S. Department of Agriculture, Agricultural Statistics, 1967 and 1973 editions.

Table 2.--Per capita consumption of sirups and honey, 1945-72

Year	Cane	Corn	Sorghum ^{1/}	Maple ^{2/}	Refiners	Edible cane molasses	Honey
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1945	1.6	12.0	1.0	0.1	1.8	0.7	1.8
1950	.7	9.2	.3	.2	.3	.4	1.6
1955	.3	9.0	.2	.2	.2	.4	1.4
1960	.2	10.1	.1	.2	.3	.3	1.4
1965	.2	13.7	(.1)	.2	.2	.3	1.3
1966	.2	14.0	(.1)	.2	.1	.3	1.2
1967	.2	14.1	(.1)	.2	.1	.3	1.1
1968	.2	14.8	(.1)	.2	.1	.4	1.1
1969	.2	15.4	(.1)	.2	.1	.3	1.3
1970	.2	15.8	--	.1	.1	.2	1.2
1971	.2	16.2	--	.1	.1	.2	1.1
1972	.2	18.7	--	.1	.1	.2	1.1

^{1/} Data in parentheses are approximations.

^{2/} Includes sirup equivalent of maple sugar.

Source: U.S. Department of Agriculture, Food Consumption, Prices, Expenditures, Agricultural Economic Report 138, July 1968, and Supplement for 1972 to AER 138, as amended.

ASSESSING MARKET POTENTIAL

Methodology

Customarily, an investigation of the market potential for an existing product would begin with an examination of (1) the recent market volume and its trend, the segmentation of the market by geographical distribution, and other pertinent classifications of market outlets and (2) various demographic factors generally looked upon as explaining consumer demand. For sorghum sirup, however, there is no recent data base upon which to proceed with such traditional analysis. Statistics of sorghum sirup production have not been reported by USDA since 1960 (table 1). Likewise, there are no per capita consumption statistics currently available for sorghum sirup (table 2).

In the absence of a current data base from which to project the future market, the alternative approach was to obtain the views of producers and marketing officials in the sirup industry and of other potential users concerning their observations about the present market for sorghum sirup and its future.

Personal interviews were held in 1973-74 with representatives of 21 firms, ranging from small- to large-volume sirup producers and blenders. Firms having national brands and also several food firms that might prospectively include sorghum sirup in their formulations were interviewed. Most of the sorghum sirup marketers visited were in the Southeast, where production is centered. Most of the larger firms marketing sirup nationally (usually several brands) were located in the Northeast.

The number of firms visited by States was as follows:

Alabama	3
Georgia	3
Kentucky	1
Louisiana	4
Maryland	1
Mississippi	1
New Jersey	1
New York	4
North Carolina	1
Tennessee	<u>2</u>

Total 21

Views about the market potential for sorghum sirup are presented in this report in a framework which considers aspects of (1) product characteristics and availability, (2) market segmentation, and (3) market structure.

Product Characteristics and Availability

A product's success in the marketplace is dependent upon its acceptance by consumers and major users. For the individual producer, prospects for successful marketing are enhanced by differentiating his product in some way from that of competitors. Sorghum sirup's distinctive flavor and its delimited geographical production offer opportunities for such product differentiation.

In the personal interviews, comments ranged from aspects of producing sweet sorghum as a crop to concepts of consumer use of sorghum sirup and sirups in general. Cultural factors and harvesting practices were discussed with reference to their effect upon the nature and quality of the sorghum sirup produced. Processors were generally concerned about tighter regulations involving health standards and labeling requirements.

At the farm level. The wide range in quality of sorghum sirup was aptly described by a veteran producer who said "Sorghum sirup is the most nonuniform product in the world -- it varies from farm to farm." Variability in the sirup's attributes of flavor and aroma, clearness or cloudiness, color, and viscosity has led to considerable rivalry among producers in different regions. More or less delimited areas such as counties, named mountain areas, or sectors of States are frequently referred to and cited on product labels to identify the locale of production.

Producers and marketers who are very familiar with the sorghum sirup ascribe its differentiating characteristics principally to soils and climate. In Louisiana, for example, producers stated that sweet sorghum grows very tall and the sirup produced there is darker and redder. Other observers stated that sorghum grown on red clay soil produces clear, bright-colored sirup while that from sandy soil is off-color and "whitish". Another contended that a certain mountain area with sandy soil is recognized as the source of sorghum sirup which is renowned for its excellent flavor. This last observation was supported by others who stated that a hazy appearance of the sirup indicates good flavor and aroma.

Comments about the different varieties of sweet sorghum emphasized cultural factors such as ability to withstand dry weather, resistance to lodging, days to maturity, and yields (in terms of sorghum sirup per acre). Staggered plantings of different varieties were recommended to spread out the harvesting season, and in the more southern latitudes, to enable planting two successive crops.

There were different opinions on the kind and amount of fertilizer to be used. Comments ranged from recommending little or no fertilizer to specific applications of phosphate and low nitrogen fertilizer.

The greatest concern of growers was the shortage and expense of farm labor and the need to find more efficient ways to get the sorghum cane from the field to the mill. Most producers and handlers commented on the difficulty of getting sufficient help to handle sorghum in the harvesting and crushing process. Furthermore, some observed that while unemployment and welfare rolls were at fairly high levels in their vicinity, they were unsuccessful in recruiting sufficient help for sorghum harvesting. Thus, there is much interest in improved mechanical harvesting and handling equipment.

Producers also stressed the need to harvest sorghum at the right time and to handle it promptly to obtain sirup of optimum quality. Delays, such as caused by shortage of labor, can result in lower yields of juice crushed from the sorghum cane and lower levels of sugar content resulting from conversion of sugar to starch in the maturing process. An associated problem may be the availability of facilities to refrigerate juice to be held in the peak harvest period until the juice can be processed. These factors emphasize the need for more mechanized harvesting facilities and efficient processing equipment.

Form of sirup--pure or blended. Product differentiation appears to be a more important consideration for those who sell sorghum sirup in its pure form, as compared with those who sell it to blenders for formulation with other sirups and sweeteners. Producers were aware of the special consideration that has to be given to existing regulations concerning the identification of sirup as pure sorghum sirup on the label.

Those firms who produce and sell pure sorghum sirup generally attempt to standardize it to achieve uniform quality. Mostly this is accomplished by the subjective method of judging visually for appearance and tasting for flavor. Conversely, the larger firms reported more sophisticated laboratory techniques, such as tests for pH, Baume, or Brix. However, they were more likely to use these tests for sweeteners produced in large volumes, such as corn sirup, maple sirup, and molasses, than for sorghum.

A number of blenders said they produce only sorghum-flavored sirup because they cannot obtain pure sorghum of sufficient quality to meet their expectations. Nevertheless, they generally felt that "the market is there," that is, for pure sorghum, if there was a dependable supply of good quality sirup.

Economic considerations motivated some of the larger blenders to limit their production to blended sorghum sirup. Because of the increase in price of pure sorghum in recent years, they recognize that it is more profitable to produce blended, sorghum-flavored sirup than pure sorghum. Because of sorghum's characteristic, relatively intense flavor, blenders maintain that the taste of sorghum is imparted to the blend when sweeteners with no distinctive flavor, such as corn sirup and sugar, are used as a base.

Quality-price considerations in procurement. Most blenders procure sorghum sirup in bulk at the lowest possible price, providing the quality meets their basic specifications and prevailing standards and regulations. Also, because this sorghum sirup is sometimes darker and stronger in flavor than the more purified forms which are milder and lighter in color, the sorghum flavor can be "stretched" in a blend of basic sweeteners, such as corn sirup and sugar. On the other hand, some blenders buy sorghum sirup according to self-imposed, sometimes stringent standards. Official U.S. standards had not been promulgated at the time of the interviews, although proposed standards of identity had been submitted for consideration by the Food and Drug Administration ^{3/}. Subsequently, standards of identity for sorghum sirup were established and published in the Federal Register on June 14, 1974, to become effective July 1, 1975 ^{4/}. These standards are in section 30.3 and are part of subchapter B, part 30, which also establishes standards for table sirup, maple sirup, and cane sirup (see Appendix).

A number of the large firms bought other sirups according to established standards or their own specifications. Because they used so little sorghum sirup, they did not consider it practical to subject samples to rigid testing. Those who employed at least minimal standards expected the sorghum sirup to meet certain levels of percent solids and expected it to be of acceptable color, viscosity, flavor, and aroma. Some blenders rejected shipments of unacceptable sirup while one reported that he generally reprocessed the sirup to bring it to the consistency desired.

A few of the blenders said they were able to obtain sorghum sirup for \$1.50 a gallon in the 1972-73 season, when they found surplus lots that farmer-producers had not been able to sell in their local retail market outlet. They admitted, however, that it was becoming increasingly difficult to obtain sirup that low in price. More commonly, prices around \$2.50 per gallon were quoted for sirup obtained in 50-gallon drums ^{5/}. Because of the relative scarcity of sorghum sirup, some blenders essentially paid the retail price.

A general problem expressed by most of the firms visited was that sources of supply upon which they previously relied were now out of business, or the suppliers did not have extra sorghum sirup to offer in wholesale lots. Thus, such firms have been making an extensive effort to locate sources of sorghum sirup for use in blending.

^{3/} Federal Register, Oct. 2, 1970, Vol. 35, No. 192, p. 15403.

^{4/} Federal Register, June 14, 1974, Vol. 39, No. 116, pp. 20879-20882 and Nov. 14, 1974, Vol. 39, No. 221, pp. 40184-40185.

^{5/} In 1974-75, these prices had increased in some markets to a range of \$3.50 to \$5.00 a gallon.

Containers and package sizes. The larger blenders have usually obtained bulk lots of sorghum sirup in 30-gallon and 55-gallon drums. Other ingredients that are used in much greater amounts, such as corn sirup and food grade black strap molasses, are received in carload lots. Some small-scale blenders obtained some sorghum sirup in consumer-size packages to meet their requirements.

The predominant consumer-size package used by producers of pure sorghum sirup in the Southeast was a metal can with a pry-up lid containing 4 pounds, equivalent to 43-fluid ounces or 1 quart and 11 ounces. Because the retail price of these 4-pound containers was in the \$2 to \$3 range, gallon cans were not used as commonly as they were in years past. On the other hand, sorghum sirup in 16-ounce glass jars were frequently seen in stores visited in the Southeast in 1973. Choice of package sizes in a blender's product line would seem to depend upon consumer preference, although the continued use of the 4-pound containers suggests a tendency for producers to adhere to the conventional size. Grocery store shelf stock of table sirup consisted mostly of glass jars above one quart capacity. As compared with sorghum sirup, however, these table sirup blends were lower in price, and thus the prices on the larger containers would not have appeared so prohibitive to consumers.

Seasonal availability. Featuring sorghum sirup as a seasonal speciality was suggested as one method of including it in the line. This called for distributing the sirup after it is produced in the fall and featuring special displays in food stores. Blenders who offered this proposal, however, did not plan to include it in their line for year-round distribution.

New product development. Market acceptance is a very important criterion in the process of developing or selecting new products. Large firms with national distribution of advertised brand sirups usually subject new product ideas to extensive screening and testing.

Some medium- to large-size blenders not currently producing a sorghum blend said that they would need to test market a product before including it in their line. As stated by an official in an intermediate-size firm, "We are much guided by market research surveys." This would involve observations as to the preferred proportions of sorghum and other sirup in the blend, package sizes, and merchandising methods.

Market Segmentation

To find market outlets for additional production of sorghum sirup, existing markets must be considered. Also, new outlets or new uses of the sirup should be explored, including its possible use as an ingredient in manufacturing other products. Ideally, it would be most efficient for producers to sell the sirup directly to buyers, with a minimum of repackaging and handling. Thus, the investigation was focused upon the needs of blenders and the possibility of selling sorghum for new product applications.

Alternative markets that had to be considered in selecting target markets included these other methods of selling that are part of the existing market channel system: (1) to wholesalers, (2) direct to retailers and chain stores, and (3) direct to consumers. The principal industrial use considered to date has been as an ingredient in the baking industry.

Invariably, the response of handlers and executives in sirup firms indicated that the trade was influenced by the wants and preferences of final consumers. Thus their marketing efforts were directed towards developing a product line that would be acceptable to the consumer market.

Widely different views concerning the consumer market for sorghum sirup were obtained. The emphasis was upon the kinds of people that were considered to be users of sorghum sirup. For analytical purposes, the findings are presented by delineating the attributes of the consumers believed to be users of sirups in general, and of sorghum sirup in particular.

Regional preference. Most agreed that sorghum sirup is consumed by people who live in the regions where it has been produced for a long time and who have been "brought up on it". While this was not a nationwide investigation, the States that were mentioned most often as comprising the principal geographic market for sorghum sirup included Alabama (particularly the northern portion), Arkansas, Georgia, Kentucky, Mississippi, and Tennessee.

Over the years consumers who have developed a taste for sorghum sirup have been mobile and now reside in other regions where it is quite likely that they are unable to buy the sirup. Thus, the ultimate market possibilities may cover a wider range than the generally recognized Southeastern and Midwest markets.

Concepts of typical sorghum sirup users. Sorghum sirup was first produced on farms where sweet sorghum was grown. Still a common practice among many farm families, even small batches of the sirup are cooked. Some time or other in their lives, many people who have been reared on Southeastern and Midwestern farms have developed a taste for sorghum sirup. In the words of a veteran producer, "The word 'sorghum' is magic to some people."

Certain other groups of the population often mentioned as principal users were the "oldtimers" and the younger people who were reared in families using sorghum sirup, thus developing a taste for it. These could be counted on to continue use of the sirup.

Less use of sirups in the diet. Sorghum sirup was considered a "staple" in the household food patterns of certain families in years past, and possibly may continue to be so regarded by some families today. However, the thinner and cheaper table sirups have gained a much larger share of the total market and presumably have displaced the use of sorghum sirup in many households.

Not only was a liking for the unique flavor of sorghum sirup associated with its former prominent place in the diet but, as one blender explained, people were engaged in more manual labor years ago and utilized more high energy foods. Now that mechanization has reduced the need for physical exertion through hard work, there is also less preference for sweeteners -- specifically, sirups.

Preference for "health," diet," or "natural" foods. Some people believe that sorghum sirup is particularly conducive to good health. No documentation of this claim is offered here, but some health food stores carry sorghum sirup in areas where normal grocery and supermarket outlets do not handle it.

Image of the consumer in the mass market. Firms that tailor their product lines to consist of items that will appeal to the mass market generally have a rather well-defined image of the "average" or "typical" consumer. Their objective is to carry items that will enjoy rapid turnover and will be purchased by a large proportion of the consumers in the national market.

Concerning users of all sirups, the major market is viewed as consisting of families in the South, living in smaller cities and less urbanized counties, and with several children in the family.

Large firms generally consider national advertising the most effective means of reaching the greatest number of people in the mass market, but they find it more difficult to reach those families envisioned in the stereotype of major sirup users.

Market Structure

To bridge the gap between (1) potentially increased supplies of sorghum sirup that would become available if a considerable number of new plants were to be established along the lines of the prototype demonstration plant and (2) unsatisfied or untapped market outlets for sorghum sirup, one has to consider the alternative marketing channels that could be utilized to handle this increased supply.

Firms of different sizes, with different channels of distribution, expressed widely different views of the market potential. Since some firms were reluctant or unable to provide statistics on volume of production, some approximation was made to classify the firms as small, intermediate, and large. Small firms were generally farmer-producers, assemblers, and smaller scale blenders. Intermediate firms were generally blenders who produced and distributed sirups for regional distribution, which includes large-volume business. The large-scale category included firms with nationally advertised brands of sirups. Since these firms are conglomerates with a variety of food products, sirups were not necessarily a major item in their product line.

Small-scale producers selling directly to consumers and retailers. It was not the objective of this investigation to extensively canvass individual farmer-producers of sorghum sirup, because they would not be likely to adopt facilities of the commercial scale demonstrated in this project. Nevertheless, several of the larger grower-producers were contacted. These firms generally sold directly to retailers or to consumers from their plants or through roadside stands.

There was a wide variation in the quality and characteristics of sorghum sirup sold by this group. This variability can have a positive, competitive effect in helping producers to differentiate their product, by featuring certain characteristics of the sirup to consumers. On the other hand, variable quality is an unfavorable factor in the view of large-scale buyers who seek relatively large lots of uniform quality.

Some small-scale producers sell their output by "peddling" the sirup in their own trucks, or with hired drivers, from store to store. Usually this marketing involves in-store promotion by setting up special displays. Most of the distribution takes place immediately after processing in the fall. When sorghum has been in short supply, inventory was insufficient to keep stores supplied throughout the year.

Small producers, assemblers, and blenders distributing to the wholesale and retail trade. In addition to farmer-producers who sell their sirup directly to consumers, either at home or through roadside stands, there are farmer-producers and other firms who are in the business of assembling and wholesaling sirup. Market outlets include merchant wholesale grocers, voluntary wholesalers, cooperative wholesalers, and in some cases, chain stores in their region.

Various degrees of success were evident in selling through wholesalers. Some merchant wholesalers do not wish to carry sorghum sirup on inventory. Understandably, it is not their function to actively promote the sirup. In other areas established outlets continued to handle sorghum sirup, both wholesale and retail, as they have in the past.

Ironically, this group of producers and assemblers were among the most optimistic firms in their outlook for the continuing demand for sorghum sirup. Yet, they were the handlers who seemed to have the most difficulty in obtaining sufficient sorghum sirup of a quality to meet their needs. Thus, they could be regarded as a potentially expanding outlet capable of handling greater quantities of sorghum sirup.

Intermediate firms with regional distribution. Among the firms in this category are some in the Southeast currently carrying sorghum blends in which they do a large volume of business. Their trading area typically covers a radius of several States. Several of these firms stated that their sorghum sirup requirements were not satisfied in some years.

The principal requirements of these firms are (1) a dependable source that can supply sirup from year to year in the quantities desired and (2) consistent quality that will meet specifications.

The major problem these firms hope to surmount is the uncertainty they face in having to search for a supply from year to year. There are fewer producers. Those producers that still make sorghum sirup prefer selling the sirup directly to consumers. Thus, they are inclined to offer only surplus product that may be of questionable quality.

The search for new sources of good quality sorghum sirup might well be satisfied by employing facilities and methods of the prototype demonstration plant.

Large firms with national distribution. These firms with national distribution feature maple-flavored and other blends of lighter sirups generally considered as table or "pancake" sirups. Since they generally pursue the mass market, in which there is a broad acceptance for sirups of these types, the large firms are not particularly interested in adding lines of sirups for which there is only a limited market, such as sorghum sirup. Nevertheless, company policy can differ from one firm to another on the matter of adding a new item that could be aimed at a specific target market. At the other extreme, products in a line for which the market has diminished soon become candidates for deletion. On balance, these large firms with national distribution are not likely to constitute a potential major market outlet for sorghum sirup, either in its pure form or in blends.

Firms using sorghum sirup as an ingredient for remanufacturing. Except for sorghum procured for blending in the manufacture of sorghum-flavored sirups, very little sorghum sirup is used as an ingredient in remanufacturing. In some isolated cases sorghum was used for candy manufacture and commercial cookie baking.

A potentially significant market outlet that should be considered is the baking industry. While food grade molasses has been a conventional ingredient in many cookie formulations, sorghum sirup conceivably might impart a distinctive flavor to new varieties of cookies and possibly other baked goods. This possibility remains to be explored and developed.

Other possibilities that could be considered in the use of sorghum sirup are in candy making and pharmaceuticals, for example, in cough preparations. Sorghum sirup cannot compete economically with certain other uses, such as a substitute for molasses in malt manufacture or as a yeast nutrient. Molasses has been much lower in price than sorghum sirup. Unless some uniquely advantageous attribute of sorghum is found, it would not be likely to supplant molasses in such industrial uses. Thus, new product ideas should logically center on emphasizing the flavor attributes of sorghum. This would serve as a unique factor for developing new products with differences that would be discerned and, hopefully, liked by consumers.

If interest in sorghum sirup should develop in the baking and other industries, one of the first requirements would be the assurance of a uniform, acceptable quality and a dependable, steady supply. Furthermore, information on technical specifications of sirup characteristics would be mandatory, because the larger users almost invariably adhere to procurement by specifications. With the present loosely knit market structure for producing and distributing sorghum sirup, significant changes would be required to develop a mechanism for pooling and standardizing sirup so as to meet these requirements of quantity and quality.

CONCLUSIONS

Sorghum sirup produced by individual producers is highly heterogeneous in character and quality attributes. While this creates a problem for blenders and other firms who seek large lots of uniform quality, many individual producers feature the unique character of their sirup in some way so as to differentiate it from that of competitors. Thus, sorghum sirup labels often show the geographic origin, sometimes as part of the brand name. In marketing it as pure sorghum sirup, however, producers must comply with existing standards and regulations on labeling.

In the existing marketing system primary producers prefer to sell the sirup locally because they hope to get the higher retail price. With the increasing scarcity and price of sorghum sirup, this practice has expanded. Thus, blenders have found it necessary to search for sirup due to the undependability of previous sources and also because some farmers have discontinued producing the sirup.

Intermediate size firms with regional markets are mainly in the business of blending sirup of different formulations for distribution through retail outlets. They also seek to differentiate their product line in terms of the percent of sorghum in the blend and the kinds of sirup and sweeteners used as a base. Their main problems are finding adequate supplies of sorghum sirup of acceptable quality and obtaining it at sufficiently low prices so as to contain the manufacturing cost within limits considered reasonable by the resale trade. Since these firms represent a significant part of the total national sorghum sirup market and are particularly desirous of finding new sources of sirup, they represent an important potential market outlet for sorghum sirup that could be produced by facilities similar to the prototype demonstration plant.

It is unlikely that major outlets will be developed through the addition of sorghum sirup items in the product lines of the largest national distributors of advertised brands of table sirups. These firms seek to develop product lines that feature brand name items that are widely used and that are well known by the mass market. Sorghum sirup continues to be an item that is known mostly by consumers in the Southeast or the Midwest. Although the sirup does not have national usage, there may be opportunities to expand the use of sorghum sirup for blending or in the formulation of other products as an alternative source of sweetening material or as an extender for commercial sweeteners.

Except for sorghum that is procured for blending in the manufacture of sorghum-flavored sirups, very little is used in manufacturing other products. Adoption of sorghum sirup as an ingredient in formulations for existing bakery products, or distinctly new products in the baking industry, is dependent upon further development. Contacts with some baking firms elicited considerable desire to evaluate samples of sorghum sirup, possibly to test it by using larger sample lots, and to examine the characteristics of sorghum that might have advantageous applications in the baking industry.

Farmers have become reluctant to grow sweet sorghum because (1) finding labor to harvest and handle it is increasingly difficult, and (2) oftentimes better returns are obtained from other crops. Thus, there is a genuine need and interest in the development of mechanized harvesting and handling machinery that will make it easier to get the sorghum cane from the field to the mill.

One of the first requisites for any large-scale expanded usage of sorghum sirup would be the assurance of dependable, steady supplies of sirup of uniform, acceptable quality. The adoption of suitable standards and use of central marketing operations could do much to increase demand and profitable returns for sorghum sirup.

RECOMMENDATIONS

1. Adopt improved processing facilities. Growers who operate their own mills and have sufficient acreage to efficiently use modern commercial equipment should benefit by remodeling their facilities along the lines of the prototype plant in the demonstration project. Certainly any new plant constructed should have the advantages of the improvements found in the demonstration plant. Adoption of modern equipment and improved processing procedures should enhance the quality of sorghum sirup and facilitate control and standardization of its characteristics so as to produce sirup of more uniform quality, tailored to industry specifications. Furthermore, these improved techniques would assist primary producers to control the sirup quality so as to comply with Federal standards for sorghum sirup sold in interstate commerce and any existing State standards.

2. Improve mechanization of harvesting and handling of sweet sorghum. Improved mechanized methods of harvesting, chopping, and transporting sorghum cane from the field to the plant are needed to overcome the hardship growers are increasingly facing in obtaining an adequate and dependable supply of labor. Furthermore, expeditious handling of the cane will retain sugar levels in the sap so as to improve the yield and quality of sirup produced per acre. Adoption of the equipment used in the demonstration project would significantly improve the efficiency of harvesting and handling sorghum from the field to the plant.

3. Develop realistic market projections for sorghum sirup. Many firms reflected optimistic expectation of increased sales of sorghum sirup through existing outlets, providing they could obtain sufficient supplies of it for repackaging or blending. It would be highly desirable to explore potential new uses or expanded uses for sorghum sirup as an ingredient in industries such as baking, confections, and pharmaceuticals, where the sirup may be used to impart unique flavors and physical characteristics to products as well as an alternative or improved sweetener. Furthermore, there may be opportunities for selling greater quantities of sorghum sirup in areas where retail outlets are not currently carrying it on the shelf, but where a demand can be developed.

4. Develop specialized outlets such as health and natural food stores and outlets catering to travelers. Because it is difficult for some people who were reared in areas where they developed a liking for sorghum sirup to find it in other parts of the country where they now reside, health food stores are becoming a likely place where sorghum can be found. Thus, the further development of this new market appears advantageous. Tourist outlets and gift shops may also be a sector of the market that could be expanded.

5. Improve farmer-producer marketing structure. To remedy the uncertainty as to the location of sorghum sirup supplies available for purchase and the price and quality specifications thereof, some form of regional or national producers association or marketing organization would be desirable. Resources could be pooled to form a cooperative or other unified processing and distributing organization that could be operated on a community or area basis.

6. Develop improved sweet sorghum varieties and compile data on costs and returns of field production. Development of new varieties that have the characteristics required for optimal sirup quality should be encouraged. New varieties should be comparatively evaluated in each region to determine those more satisfactory for that region. To determine the profitability of sweet sorghum production as a farm enterprise, data should be compiled on the costs of growing and harvesting the crop and on the gross and net returns per acre. Consideration should be given to the possibility of double cropping. Results of such studies would indicate whether or not growing sweet sorghum would be a desirable use of land.

APPENDIX

Standards of Identity for Sorghum Sirup

Following are the Standards of Identity for Sorghum Sirup, extracted from the Federal Register, pages 20879 and 20882, Friday, June 14, 1974, which became effective July 1, 1975 (Federal Register, pages 40184-85, November 14, 1974):

SUBCHAPTER B--FOOD AND FOOD PRODUCTS

PART 30--TABLE SIRUPS

Establishment of Standards of Identity

* * * * *

30.4 Sorghum sirup; identity; label statement of optional ingredients

(a) Sorghum sirup is the liquid food derived by concentration and heat treatment of the juice of sorghum cane (sorgos) (*Sorghum vulgare*). It contains not less than 74 percent by weight of soluble solids derived solely from such juice. The concentration may be adjusted with or without added water. It may contain one or more of the optional ingredients provided for in paragraph (b) of this section. All ingredients from which the food is fabricated shall be safe and suitable.

(b) The optional ingredients that may be used in sorghum sirup are:

- (1) Salt.
- (2) Chemical preservatives.
- (3) Defoaming agents.
- (4) Enzymes.
- (5) Anticrystallizing agents.
- (6) Antisolidifying agents.

(c) The name of the food is "sorghum sirup" or "sorghum". Alternatively, the word "sirup" may be spelled "syrup".

(d) Each of the optional ingredients used shall be declared on the label as required by the applicable sections of Part 1 of this chapter.

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